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A. Lillehaug, R. Gudding, and J. I. Erdal

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Author - Auteur
Atle LILLEHAUG, Roar GUDDING, Jon Inge ERDAL

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Person requesting
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Dr. Derek Shaw
Northwest Atlantic Fisheries Centre
P.O. Box 5667
St. John's, Newfoundland A1C 5X1

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VACCINATION OF SALMON AGAINST FURUNCULOSIS

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Atle Lillehaug,
Roar Gudding, and
Jon Inge Erdal
Veterinary Institute

VACCINATION OF SALMON AGAINST FURUNCULOSIS

Field experiences form basis
for next season's vaccination program

Results of vaccine trials

Field testing of vaccines against furunculosis commenced under the direction of the Veterinary Institute in spring 1989. The experiment has been conducted at seven food fish farms. Two injection vaccines, both containing adjuvants, were tested. In spring 1989, the farms mixed vaccinated and unvaccinated test fish and placed them in one cage. The fish wore tags to make them distinguishable from each other. The other fish on the farms were not vaccinated, so that the test fish were exposed to a great infection pressure during outbreaks of furunculosis.

Six of the seven farms had outbreaks of furunculosis in the course of summer and fall 1989. Five of the outbreaks were allowed to develop without application of antibiotics, and furunculosis-caused mortality continued til November/December. The average rate of protection provided

by vaccination on the six farms was for the entire period 60 - 70 %, and this rate stayed more or less unchanged to the end of the year. These results constituted the basis for a recommendation by the authorities that vaccination be carried out on smolt stocked in spring 1990 in furunculosis-infected areas.

In May, a good year after the vaccination, one of the farms participating in the field experiment was hit by a furunculosis outbreak. In this case as well, mortality was higher among unvaccinated than vaccinated fish, but the protection rate was as low as 30 %.

The results of the field experiments show that mortality caused by a furunculosis outbreak is about three times higher among unvaccinated fish than fish receiving vaccine shots. The effect continues through the first summer and the fall when the fish descend to the sea. A year after the vaccination, some effect still remains but in a significantly reduced form.

Secondary effects

In the beginning of the spring 1990 vaccination season, acute mortality occurred on several farms in connection with one of the furunculosis vaccines. Fish died in the course of the first few hours following the vaccination. Mortalities of up to 15 % were recorded at some farms. The vaccine used had a higher Formalin content than other fish vaccines. Studies indicate that this may have been the main cause of the mortality. Occurrence of mortality is probably influenced also by other factors such

as low water temperature or anaesthetic method. Fish vaccines with such a high Formalin content will not be permitted in the future in Norway.

The secondary effects registered in vaccinated fish in connection with the vaccine tests included organ adhesions in the abdominal cavity. Such changes have been observed in 1990 to be caused in individual cases by normal use of vaccines as well. The extent of the adhesions varies significantly. The changes observed so far have not been sufficiently serious to affect slaughter quality. It is conceivable, however, that the fish could be affected negatively; they could undergo, for example, some degree of growth inhibition.

The occurrence of adhesions is probably related to the presence of adjuvants in the vaccines. Furunculosis vaccines contains aluminum salts. It is recommendable that vaccine producers investigate whether the adjuvant content of vaccines could be reduced without lowering the protective effect, and possibly, whether other types of adjuvants could be used.

The injection method seems to have relevance for the extent of the adhesions. Furunculosis vaccination is recommended to be performed so that the fish receive the shot relatively far back, that is, between or just in front of the ventral fins.

Absence of smolting among vaccinated fish was reported in one case. Aluminum in water is known to have a negative effect on smolting. Thus, it can not be excluded that the aluminum salts in the adjuvants may have

played a role. However, the probability that it was the vaccine that produced this phenomenon is very slight. Furunculosis vaccinations were performed on more than 100 farms during the same season in spring 1990, while this phenomenon was reported only once. However, the Veterinary Institute will take up the case for a detailed examination.

Field experiences

About 2000 liters of furunculosis vaccine were used in Norway in the spring of 1990. This quantity is sufficient for vaccinating 20 million smolts. Field experiences indicate that the vaccine does not offer complete protection against furunculosis, as outbreaks are reported among vaccinated fish as well. However, vaccinated fish seem on an average to be affected later than unvaccinated fish, and individual farms and areas carrying out full-scale vaccinations have been able to fully avoid the disease.

To gather a greater amount of representative data both on the secondary effects and the effectiveness of the vaccines, the Veterinary Institute will carry out in the fall a more systematic collection of reports from fish farmers, hoping that as many as possible will respond by filling out the questionnaires.

Vaccination program

Both field trials with furunculosis vaccines and experiences from the field indicate that losses caused by furunculosis can be reduced by the

vaccines presently available. It was recommended that fish to be placed out in the sea in spring 1990 receive furunculosis shots in the spring prior to being set out. Judging by the experience gathered, it is advisable to apply this vaccination schedule to smolt to be placed out next year as well. This means that the fish are vaccinated preferably 1 - 2 months before being set out.

The effectiveness of other vaccination schedules is not known. Two vaccination rounds are known to result generally in a better protection than one. Most probably this applies to vaccinations against furunculosis as well. Therefore, one vaccination in the fall and another in the spring can be assumed to bring better results. However, it is uncertain whether the resulting effect is sufficiently better to be profitable. A fall vaccination could be performed by immersion or injection, immersion being probably the most suitable method. The fish are relatively small at this stage, and the side effects known to follow injection of the vaccines in question can be assumed to be more pronounced. Whether the fish are immersion-vaccinated in the previous fall or not, the spring vaccination should be carried out by the injection method. Two vaccinations by immersion seem not to give any better results than one vaccination by injection.

As the protection given by vaccination is gradually reduced, it is important to vaccinate fish also after they have spent a year in the sea. This can be done also with fish previously not vaccinated. Vaccination is to a given degree always stressful for the fish because of the handling involved, and therefore, it has to be done early in the

spring before water temperatures become high enough to constitute an increased risk of furunculosis or vibriosis outbreaks.

At the moment, furunculosis vaccines are not available in combinations with vaccines against other infections. Therefore, vaccinations against vibriosis/coldwater vibriosis and furunculosis have to be conducted as two separate operations. However, several vaccine producers are making efforts to develop combination vaccines. If such a vaccine is available by spring 1991, it will be possible to inject fish with vaccines against all three diseases at the same time.

It is to be emphasized that vaccination must be regarded as just one of several preventive measures. Even if fish are vaccinated, other precautions must be still be taken against disease outbreaks and transmission. Correct use of vaccines, together with the other preventive measures, improve the possibilities of raising the fish til slaughter without great losses and without antibiotics, even in areas where furunculosis is widespread.